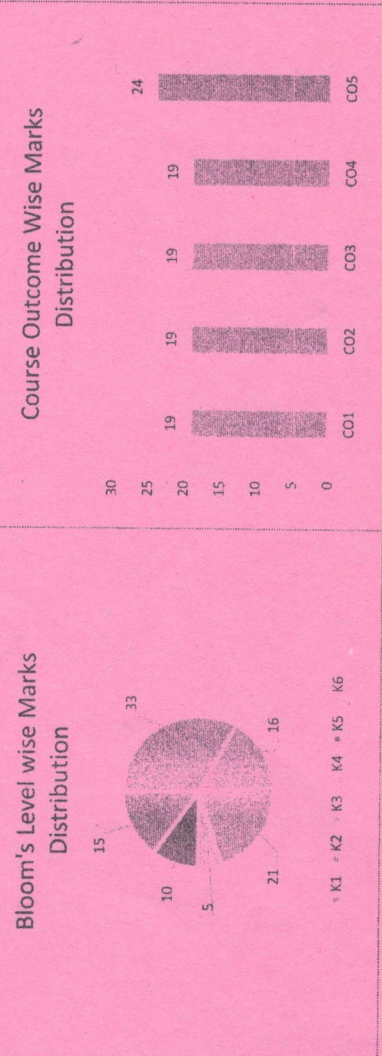


CO- Course Outcomes,	KL- Knowledge Level,	PO – Program Outcome
[CO1]	Understand the basic difference between incompressible and compressible flow.	
[CO2]	Understand the phenomenon of shock waves and its effect on flow.	
[CO3]	Apply gas dynamics principles in the Jet and Space Propulsion.	
[CO4]	Understand the phenomenon of shock waves and its effect on flow.	
[CO5]	Apply gas dynamics principles in the Jet and Space Propulsion.	

GRAFICAL REPRESENTATION



JGI	ARKA JAIN University Jharkhand	NAAC GRADE A ACCREDITED UNIVERSITY	END SEM EXAMINATION School of Engineering & IT
Branch	Mechanical Engineering	Program	B.Tech
Subject Name	Gas Turbine & Jet Propulsion	Semester	VII
		Year	Nov/Dec-2024
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't Write on the 1st Page Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Gas Table is allowed Possession of Mobile Phones or any kind of Written Material, Arguments with the Invigilator or Discussing with Co-Student will come under Unfair Means and will Result in the Cancellation of the Papers. 		
Knowledge Level (KL)	K1 : Remembering K2 : Understanding	K3 : Applying K4 : Analysing	K5 : Evaluating K6 : Creating

Q.N1	QUESTIONS	Marks		
		COs	KL	PO
i	Distinguish between mach wave and normal shock?	2	CO1 K1	PO2
ii	Define Mach number?	2	CO1 K2	PO1
iii	Write down the ratio of velocities between any two sections in terms of their Mach number in a fanno flow?	2	CO2 K1	PO2
iv	Give the expression to find increase in entropy for Fanno flow?	2	CO2 K2	PO3
v	What do you mean by shock wave?	2	CO3 K3	PO1
vi	Define strength of shock wave?	2	CO3 K1	PO2
vii	What is Thrust Specific Fuel Consumption (TSFC)?	2	CO4 K3	PO2
viii	What are the various types of air breathing engine?	2	CO4 K1	PO3
ix	Differentiate jet propulsion and Rocket propulsion.	2	CO5 K2	PO2
x	What is bi propellant?	2	CO5 K3	PO1

Section B (Answer any FOUR out of SIX) - 20 Marks

(Each question Carry 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
2	A supersonic nozzle expands air from $P_0 = 25$ bar and $T_0 = 1050\text{K}$ to an exit pressure of 4.35 bar: the exit area of the nozzle is 100 cm^2 . Determine i) throat area ii) pressure and temperature at the throat iii) temperature at exit iv) Exit velocity as fraction of the maximum attainable velocity v mass flow rate.	5	CO1	K4	PO2
3	Air enters a combustion chamber with certain Mach number. Sufficient heat is added to obtain a stagnation temperature ratio of 3 and a final Mach number of 0.8. Determine the Mach number at entry and the percentage loss in static pressure. Take $\gamma = 1.4$ and $C_p = 1.005\text{ kJ/Kg K}$.	5	CO2	K3	PO3
4	The velocity of a normal shock wave moving into stagnant air ($P = 1.0$ bar, $T = 17^\circ\text{C}$) is 500 m/s . if the area of cross section of the duct is constant, determine pressure, temperature, velocity of air, stagnation temperature and Mach number imparted upstream of the wave front	5	CO3	K6	PO1
5	Explain the principle of operation of a turbojet engine and state its advantages and disadvantage	5	CO4	K1	PO3
6	Explain with a neat sketch the working of a gas pressure feed system used in liquid propellant rocket engines.	5	CO5	K1	PO1
7	Describe the important properties of liquid and solid propellants desired for rocket propulsion.	5	CO5	K1	PO3

Section C (Answer any THREE out of FIVE) - 30 Marks

(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL	PO
8	What is the effect of Mach number on compressibility? Prove for $\gamma=1.4$, $P_0 - P / \frac{1}{2} \rho C^2 = 1 + \frac{1}{4} M^2 + \frac{1}{40} M^4 + \dots$	10	CO1	K5	PO1
9	Air enters a constant area duct at $M1 = 3$, $P1 = 1$ atm and $T1 = 300\text{ K}$. inside the duct the heat added per unit mass is $q = 3 \times 10^5\text{ J/Kg}$. Calculate the flow properties $M2$, $P2$, $T2$, $\rho2$, T_02 and P_02 at the exit.	10	CO2	K6	PO3
10	Derive the equation for Mach number in the downstream of the normal shock wave.	10	CO3	K2	PO2
11	Explain with a neat sketch the principle of operation of a ramjet engine and state its	10	CO4	K3	PO2

advantages and disadvantages.

Derive the thrust equation for rocket engines.

12



PO1

K1

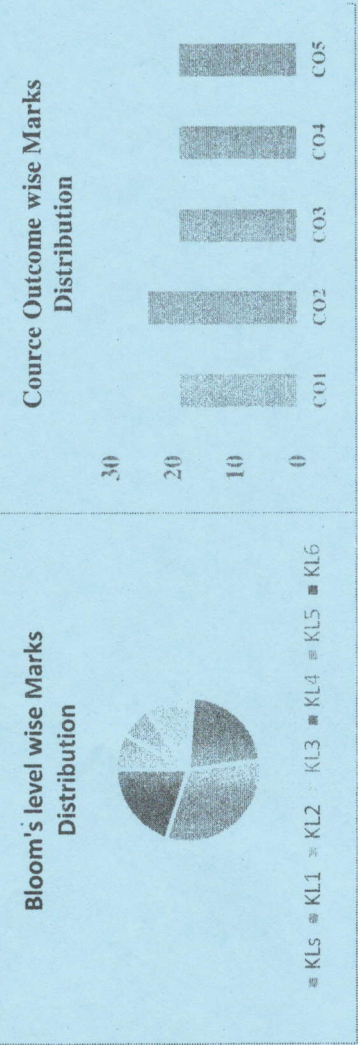
CO5

10

(M) 30/11

				END SEM EXAMINATION School of Engineering & IT	
Branch	Mechanical Engineering	Program	B.Tech		
Subject Name	Power Plant Engineering	Semester	VII		
		Year	Nov/Dec 2024		
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't Write on the 1st Page Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Possession of <u>Mobile Phone</u> or any kind of <u>Written Material</u>, <u>Arguments with the Invigilator</u> or <u>Discussion with Co-Student</u> will come under <u>Unfair Means</u> and will Result in the Cancellation of the Paper(s). 				
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating		
	K2 : Understanding	K4 : Analysing	K6 : Creating		

CO- Course Outcomes,	KL- Knowledge Level,	PO - Program Outcome
CO1	Analyze different types of sources and mathematical expressions related to thermodynamics and various terms and factors involved with power plant operation.	
CO2	Analyze the working and layout of steam power plants and the different systems comprising the plant and discuss about its economic and safety impacts.	
CO3	Combine concepts of previously learnt courses to define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types.	
CO4	Understand the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it.	
CO5	Understand the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.	



Section A (Each question Carry 02 Marks from Q1-i to x - 20 Marks)					
Q. N1	QUESTIONS	Marks	COs	KL	
i	Describe super critical boilers.	2	CO1	K2	
ii	List the methods used for handling of coal.	2	CO3	K1	
iii	Tell any two drawbacks of a stationary gas turbine power plant for generation of electricity.	2	CO2	K1	
iv	Demonstrate the process in combined cycle power plant.	2	CO2	K2	
v	Name the three moderators used in nuclear power plants.	2	CO5	K3	
vi	Explain the requirements of fission process.	2	CO3	K4	
vii	Analyze the three main factors of power output of hydroelectric plant.	2	CO3	K1	
viii	List the difference between Francis and Kaplan Turbine	2	CO1	K4	
ix	Describe depreciation.	2	CO1	K2	
x	Illustrate the significance of load curve	2	CO1	K2	

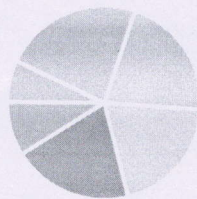
- a) Average load on the power plant.
 b) Energy Supplied per year.
 c) Demand factor.
 d) Diversity factor.

Section B (Answer any FOUR out of SIX) – 20 Marks (Each question Carry 05 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
2	Describe the fuel handling system of thermal power plant.	5	CO2	K5
3	Explain the construction and working of any one High pressure boiler with a layout.	5	CO3	K3
4	Discuss why combined cycle power generation is so important in present day energy scenario.	5	CO6	K4
5	With neat diagram explain boiler water reactor. Also mention its advantages and disadvantages	5	CO4	K4
6	Draw a schematic diagram of a hydro plant and explain the operation.	5	CO4	K4
7	Explain load curves and load duration curves? Discuss their utility in the economics of generation.	5	CO2	K5
Section C (Answer any THREE out of FIVE) – 30 Marks- (Each question Carry 10 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
8	Steam power plant runs on a single regenerative heating process. The steam enters the turbine at 30 bar and 400°C and steam fraction is withdrawn at 5 bar. The remaining steam exhausts at 0.10 bar to the condenser. Calculate the efficiency and steam rate of the power plant. Neglect the pump works.	10	CO2	K5
9	In a gas turbine power plant working on Brayton cycle, the inlet air temperature is 30°C and pressure is 1.0 bar, the pressure ratio is 6.25 and the maximum temperature is 827°C. Find (a) the compression work (b) the turbine work, (c) the cycle efficiency and (d) the work ratio. Compared the efficiency with Carnot cycle operating between the same temperature limits.	10	CO3	K3
10	Write about principles of nuclear energy. List out the various power plants station in India. With neat sketch explain anyone.	10	CO6	K4
11	Classify the hydraulic turbines. Explain anyone with a suitable sketch.	10	CO4	K4
12	The peak load on a thermal power plant is 75 MW. The loads having maximum demands of 35 MW, 20 MW, 15 MW and 18 MW are connected to the power plant. The capacity of the power plant is 90 MW and the annual load factor is 0.53. Calculate the:	10	CO4	K4

CO1	Select the process, equipment and tools for various industrial products.
CO2	Prepare process planning activity chart.
CO3	Explain the concept of cost estimation.
CO4	Compute the job order cost for different type of shop floor.
CO5	Calculate the machining time for various machining operations

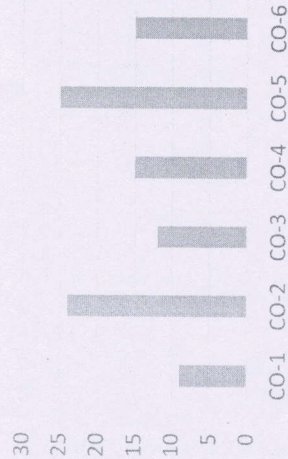
GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



■ K1 ■ K2 ■ K3 ■ K4 ■ K5 ■ K6

Course Outcome wise Marks Distribution



**END SEM EXAMINATION
School of Engineering & IT**

Branch	Mechanical Engineering	Program	B. Tech	[BACKLOG]
Subject Name	Process Planning and Cost Estimation	Semester	VII	
		Year	Nov/Dec 2024	
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't Write on the 1st Page Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Possession of Mobile Phone or any kind of Written Material, Arguments with the Invigilator or Discussion with Co-Student will come under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Paper(s)</u>. 			
Knowledge Level (KL)	K1 : Remembering K2 : Understanding	K3 : Applying K4 : Analysing	K5 : Evaluating K6 : Creating	

Section A (Each question Carry 02 Marks from Q1-i to x - 20 Marks)

Q.N	QUESTIONS	Marks	COs	KL
1	Define Process Planning.	2	CO2	KL1
i	What are the functions of process planning?	2	CO3	KL5
ii	What are the information required to do process planning?	2	CO3	KL1
iii	Write the approaches of process planning.	2	CO5	KL1
iv	What are the factors should be considered for process and equipment selection?	2	CO5	KL1
v	What are the stages of machine selection process?	2	CO3	KL5
vi	Differentiate between continuous cutting and intermittent cutting with an example.	2	CO3	KL1
vii	Brief on cost accounting	2	CO1	KL1
viii	Estimate the direct material cost involved in gas welding process.	2	CO1	KL1
ix	Define feed rate.	2	CO1	KL1
x		2	CO1	KL1

Section B (Answer any FOUR out of SIX) – 20 Marks

(Each question Carry 05 Marks)



Q. No.	QUESTIONS	Marks	COs	KL
2	Explain the basic steps of the design and development of a new product approach for material selection process.	05	CO3	KL2
3	What are the set of documents required for process planning?	05	CO3	KL2
4	Explain in detail about the types of estimates and how it is done?	05	CO4	KL4
5	What are the factor influencing process selection and write down the process selection parameter.	05	CO2	KL4
6	A small driveshaft is produced using a CNC lathe. The machine operator's hourly rate is Rs.8.30 per hour The time taken to machine the driveshaft is 15 min. The order is for 1500 units. Calculate the direct labour cost for producing the drive shafts.	05	CO4	KL2
7	List and explain in detail about the objectives of cost accounting?	05	CO3	KL2

Section C (Answer any THREE out of FIVE) – 30 Marks

(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Explain the use of computers in process planning and cost estimation and list out the advantages of CAPP.	10	CO2	KL3
9	Explain the main functions of Product design and manufacture and its interface in detail?	10	CO1	KL2
10	Discuss about the principles of jigs and fixtures design	10	CO5	KL4
11	Discuss the estimation of operation cost procedure in forging operation	10	CO5	KL3
12	A bolt can be produced either by capstan late or CNC lathe. In capstan lathe, time taken is 1 hour and overhead cost is 50% of labour cost. In CNC lathe time taken is 5 hours for 100 products and overhead cost is 120% of labour cost. The material cost of each product is Rs. 60 and labour cost is Rs. 50/hour in both machines. Which of these two machines is economical for making the bolt?	10	CO5	KL1

14/9/12

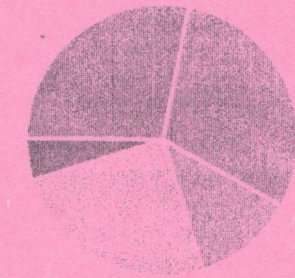
				END SEM EXAMINATION School of Engineering & IT	
Branch	Mechanical Engineering	Program	B. Tech	Semester	VII
Subject Name	Automation in Manufacturing	Year	Nov/Dec 2024		
Time: 3 Hour Max. Marks : 70	<ul style="list-style-type: none"> Start writing from 2nd page onwards; don't Write on the 1st Page Backside Answer all Questions of Section A (Compulsory) Answer Any Four out of Six of Section B Answer Any Three out of Five of Section C Possession of <u>Mobile Phone</u> or any kind of <u>Written Material, Arguments with the Invigilator or Discussion with Co-Student</u> will come under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Paper(s)</u>. 				
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating		
	K2 : Understanding	K4 : Analysing	K6 : Creating		

Section A (Each question Carry 02 Marks from Q1-i to x - 20 Marks)					
Q.N	QUESTIONS	Marks	COs	KL	
1					
i	Enlist the essential components of a manufacturing system.	2	CO1	K1	
ii	Define programmable automation in Production System.	2	CO2	K1	
iii	What are main components of an NC System?	2	CO2	K2	
iv	What do you understand by fixed cost and variable cost in manufacturing?	2	CO2	K1	
v	Make a list of Part feeding devices in automatic assembly system.	2	CO3	K2	
vi	Define APT language in Part Programming.	2	CO2	K2	
vii	Write statement to define a line in APT programming.	2	CO3	K2	
viii	What is process routes in Manufacturing?	2	CO4	K3	
ix	Write any four postprocessor statement used in APT part Programming.	2	CO4	K1	
x	Give example of single station manual production machine.	2	CO5	K2	

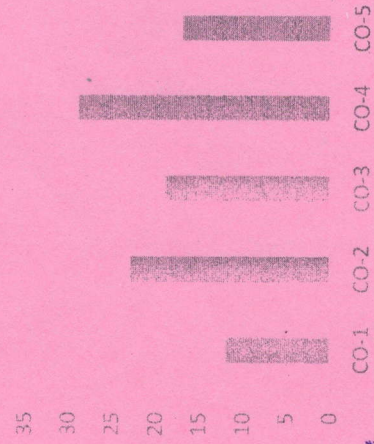
CO1	Understand the concept and types of automation
CO2	Assessment of degree and level of automation
CO3	Justification of automation in Manufacturing.
CO4	To get the knowledge of various elements of manufacturing automation - CAD/CAM, sensors, pneumatics, hydraulics and CNC
CO5	Understanding transfer lines and advanced industrial automation

GRAPHICAL REPRESENTATION

Bloom's level wise Marks Distribution



Course Outcome wise Marks Distribution



■ K1 ■ K2 ■ K3 ■ K4 ■ K5 ■ K6

Section B (Answer any FOUR out of SIX) – 20 Marks
(Each question Carry 05 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	What is ATP? Brief any 2 postprocessor statement used in ATP.	5	CO2	K2
3	What are different types of Production System? Compare them with respect to variety and volume of production.	5	CO1	K1
4	Describe the importance of automated material handling systems in modern manufacturing facilities. What are the key components and technologies used in automated material handling?	5	CO1	K1
5	What is the difference between agile and flexible manufacturing systems?	5	CO3	K2
6	What are levels of automation in manufacturing? Also Explain their key features.	5	CO4	K4
7	How are optimization techniques applied to optimize production schedules, resource allocation, and product quality?	5	CO5	K5

Section C (Answer any THREE out of FIVE) – 30 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Why does automation needed in manufacturing? Explain any one of Automation Migration Strategy.	10	CO2	K1
9	What are different types of automation? Also write their key features.	10	CO3	K2
10	Compare and contrast single station manned workstations and single station automated cells in manufacturing environments.	10	CO4	K3
11	How can design for manufacturability (DFM) and design for assembly (DFA) principles be integrated into the product design process?	10	CO4	K4
12	How do flexible manufacturing systems (FMS) and agile manufacturing systems differ from traditional manufacturing approaches?	10	CO5	K4